

# The Golden Fetters and the Causal Effects of Countercyclical Monetary Policy

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**Sixth CEPR Economic History Symposium**  
**Banca d'Italia, Roma**

# Monetary policy trade-offs for open economies

1. Stabilize real/nominal variables following domestic/external shocks
2. Maintain currency values using fixed-exchange rate regimes

Often incompatible:

- Positive external demand shock (increase in price of principal export) may necessitate monetary tightening
- Inconsistent with peg under capital mobility

Relevant today as many commodity exporters peg their currencies and face recent volatility in commodity prices

s paper: should monetary policy be countercyclical with respect to external demand shocks?

Causal empirical estimates of the benefits of countercyclical monetary policy when observing fixed exchange rates

Data and experiments from Classical Gold Standard era (1870-1913)

- Identify external demand shocks as principal-export price fluctuations
- Exogenous policy: base-country rates determines domestic interest rates (“trilemma instrument”)

New data

- Short-term interest rates, principal exports (30 economies), and international commodity (export) prices between 1870 and 1913.

# Commodity-policy “lottery”

estimate local average treatment effects from exogenous combinations of external demand shocks and monetary policy shocks.

experiments

External demand shock taking monetary policy as given

Monetary policy shock taking external demand shocks as given

External demand shocks (measured by changes in principal export prices) and interest-rate shocks (trilemma instrument) not strongly correlated => different combinations of shocks, including

**countercyclical monetary policy**

- **Countercyclical MP defined as:**

1. Interest rates and export prices both increase
2. Interest rates and export prices both decline

# Preview of Results

Positive effect of export-price shocks on macroeconomic variables

- 1 SD increase  $\rightarrow$  real GDP being 1.3 percent larger and the price level being 2 percent higher after 3 years

Negative effect of interest-rate shocks on  $P, Y$

- 1 SD increase  $\rightarrow$  real GDP being 7 percent smaller and the price level 4 percent lower after 3 years

Effect of principal-export prices on real GDP when interest rates are countercyclical is about half the size of the effect as when interest rates are either procyclical or acyclical.

Monetary policy has ability to stabilize positive external-demand shocks, but not negative external-demand shocks.

# Contribution to the literature

Empirical evaluation of monetary policy for open economies and commodity exporters

- Focus so far on structural work: Gali and Monacelli 2005, Catão and Chang 2013, Catão and Chang 2015 and Vogel et al 2015
- Theoretical and empirical work on effect of commodity prices: Mendoza 1995, Kose 2002, Drechsel and Tenreyro 2017, Fernández et al 2017, Schmitt-Grohe and Uribe 2017, Gelos and Ustyugova 2017, Benguria et al 2018
- Empirical work on effect of monetary experiments: di Giovanni and Shambaugh 2008, di Giovanni et al 2009, and Jorda et al 2015, 2017

Classical Gold Standard: short-run macroeconomic effects of commodity lottery

- Long-run effects on GDP (Blattman et al, 2007)
- Short-run effects on currency risk (Mitchener and Pina, 2016)

# Outline

1. *Introduction*

2. **Data**

3. Empirical Framework

4. Results

5. Conclusion

# Data

Short-term interest rates

Principal exports

Principal export prices

GDP and Price Level

Other controls



# Data on interest rates

## Sources

- Neal and Weidenmier (2003), Mitchener and Weidenmier (2015)
- Accominotti et. al. (2011)
- Jorda et. al. (2015)
- Country-specific

## Short-term interest rates

### Open market rate or discount rate

Crucial determinant of credit conditions in domestic markets

### Good proxy for monetary policy instrument

- when not available gov bond yields

# Country-specific sources interest rates

: Yields on government perpetuities ("apolices"). Published in "Common factors in Latin America's business cycles." Journal of Development Economics 95.2 (2011): 212-228.

da: Montreal call rates. Furlong, Kieran. "Economic fluctuations in Canada, 1867-1897." PhD diss., National Library of Canada= Bibliothèque nationale du Canada, 1999.

: Hansen, Bent. "Interest rates and foreign capital in Egypt under British occupation." The Journal of Economic History 43.4 (1983): 867-884.

d: GFD database. Iceland 3-month REIBOR (Reykjavik Interbank Offer Rate): Central Bank of Iceland Quarterly Bulletin and web site. For more information on the REIBOR/REIBID market, see [sedlabanki.is/uploads/files/MB023%204.pdf](http://sedlabanki.is/uploads/files/MB023%204.pdf)

Average discount rates on bills of exchange from banks (%). Quiroz, Alfonso (1986), Financial Institutions in Peruvian Export Economy and Society, 1884-1930, PhD Thesis in History, Columbia University, p. 430-431. Quiroz obtained the data from contemporary newspapers and magazines El Comercio, El Financista, El Economista, Economista Peruano, La Gaceta Comercial, Revista de Cambios y Valores

y: Current yield of Turkish bonds. 1870-1884: 6% 1862 Loan; 1884-1890: 5% Priority Bonds; 1891-1905: 5% Priority Loan; 1906-1913: 4% 1891. Source: Investors' Monthly Manual, Times. Published in: Tuncer, M. (ed.) Sovereign Debt and International Financial Control - The Middle East and the Balkans, 1870-1914. London: Palgrave Macmillan.

Principal  
Exports data

ources:

British Board of Trade,  
various years

acobson 1909,  
Mitchell 1982 2007a, b

JAPAN.  
PRINCIPAL ARTICLES EXPORTED.  
QUANTITIES and VALUE of the PRINCIPAL ARTICLES.

PRINCIPAL ARTICLES.	1895.	1896.†	1897.†	1898.†	1899.
Bamboo and other Wood - - Yen	545,000	772,000	1,108,000	1,293,000	1,490,000
Camphor - - - - {	Kin	2,238,000	6,014,000	5,782,000	4,727,000
Coal - - - - {	Yen	1,529,000	3,967,000	2,647,000	2,137,000
Copper - - - - {	Tons	1,845,000	2,202,000	2,112,000	2,204,000
Cotton Yarn - - - - {	Yen	7,605,000	8,902,000	11,577,000	15,237,000
Cotton Tissues - - - - {	Kin	24,187,000	24,184,000	23,225,000	27,424,000
Earthenware and Porcelain - - - - {	Yen	5,158,000	5,479,000	5,775,000	7,267,000
Fans - - - - {	Kin	3,533,000	12,975,000	42,035,000	68,834,000
Fish (including Shell-fish) - - - - {	Yen	1,034,000	4,029,000	13,490,000	20,117,000
Lacquered Ware - - - - -	Yen	3,952,000	3,533,000	3,800,000	3,920,000
Matches - - - - -	"	1,955,000	1,975,000	1,819,000	1,991,000
Mats, for flooring - - - - {	No.	11,574,000	20,288,000	26,259,000	18,237,000
Paper - - - - {	Yen	400,000	694,000	886,000	499,000
Rice - - - - -	Yen	2,300,000	2,519,000	2,771,000	2,736,000
Sea-weed - - - - -	"	1,083,000	948,000	767,000	783,000
Silk, Raw - - - - {	Gross	16,914,000	17,980,000	19,538,000	22,078,000
Silk ("Noshi") - - - - {	Yen	4,673,000	4,986,000	5,642,000	6,274,000
Silk ("Noshi") - - - - {	Yen	3,461,000	3,058,000	3,234,000	3,940,000
Silk ("Noshi") - - - - {	" "	498,000	803,000	918,000	1,132,000
Silk ("Noshi") - - - - {	Picul	1,800,000	2,281,000	2,032,000	1,799,000
Silk ("Noshi") - - - - {	Yen	7,210,000	8,872,000	7,941,000	8,088,000
Silk ("Noshi") - - - - {	Yen	1,105,000	1,228,000	1,433,000	1,333,000
Silk ("Noshi") - - - - {	Kin	5,810,000	3,919,000	6,920,000	4,837,000
Silk ("Noshi") - - - - {	Yen	47,866,000	28,831,000	55,630,000	42,047,000
Silk ("Noshi") - - - - {	Kin	1,597,000	1,628,000	1,462,000	1,403,000
Silk ("Noshi") - - - - {	Yen	1,947,000	1,948,000	1,182,000	1,082,000

Principal  
port-price  
ta  
rces  
ne Economist and  
attman et al (2007)

Feb. 23, 1878.]

THE ECONOMIST.

COMMERCIAL TIMES.  
WEEKLY PRICE CURRENT.

\* \* The prices in the following list are revised on Friday, assisted by an eminent firm in each department.

LONDON, FRIDAY EVENING.

Ashe—duty free s d s d  
Pot. Canada 1st sort. p cwt 23 6 24 0  
Pearl do do 32 0 0 0

Brimstone—

Rough.....per ton £2 10 5 15

Refined.....9 0 10 0

Floor.....211 10 13 10

Cocoa—duty 1d per lb s d s d

Fair to good Trinidad. pr cwt 78 0 83 0

Granada.....68 0 77 0

Guayaquil.....70 0 80 0

Surinam.....72 0 78 0

Coffee—duty 14/ per cwt; dried, roasted,  
or ground, 2d per lb.

Ceylon, plantation low mid. 104 0 105 0

Middling to fine.....108 0 121 6

Native, good ordinary... 79 0 81 0

East India, plantation... 68 0 129 0

Native.....77 0 89 0

Fine Mysore.....110 0 130 0

Manila, fair Indian.....79 0 81 0

Singapore, Benthys.....97 0 103 0

Mocha, fair to good.....97 0 84 0

Jamaica, good to fine ord... 93 0 120 0

Low middling to fine.....93 0 104 0

Costa Rica, good and fine... 87 0 90 0

Fair.....81 0 84 0

Central American.....82 0 102 0

Colony.....89 0 91 0

Brazil, Rio low superior... 76 0 77 0

Good first.....69 0 73 0

Fair to good channel.....63 0 67 0

Common channel.....63 0 67 0

Washed, fair to good... 73 0 75 0

Santos.....67 0 70 0

Bahia.....58 0 61 0

Common.....58 0 61 0

Cotton—per lb. s d s d

Madras, West, fair to good fair 54 6 54 6

Timevelly do do 54 6 54 6

Chemicals—

Acid, citric.....per lb s d s d

Quale.....1 4 1 4

Tartaric.....per ton £8 15 8 17 6

Alum, lump.....per ton £5 0 5 0

Ammonia, carbonate per lb 0 5 0 6 4

Muriate.....per ton £21 0 21 10

Sulphate.....per cwt 28 0 0 0

Arsenic, lump.....9 10 11 0

Powder.....6 0 6 3

Bleaching powder.....37 6 0 0

Borax, English, refined... 37 6 0 0

Cream tartar.....per lb 0 4 0 0

Iodine.....per oz 0 10 0 10 4

Potash, bichromate.....per lb 0 4 0 0

Chlorate.....0 7 0 0

Hydrodate.....12 0 13 6

Prussiate.....0 10 0 11 4

Sulphate.....per ton £11 0 0 0

Soda, ash.....per degree 0 1 0 0

Bicarbonate.....per cwt 9 0 0 0

Crystals, ex ship. per ton £3 10 0 0

Sugar lead, white.....per cwt 37 0 0 0

Brown.....26 0 0 0

Sulphate Quinine.....per oz 9 6 0 0

French.....9 3 0 0

Sulphate, copper.....per cwt 19 0 0 0

Zinc.....18 0 0 0

Vermillion, English.....per lb 3 0 0 0

Fruit (con.)—Raisins—

Sultana.....s d s d

Elleme.....33 0 36 0

Oranges—S. Michael p. case.....33 0 43 0

V-lencia.....17 0 23 0

Lisbon & St. Ubeal chet.....11 0 19 0

Palermo.....6 6 7 0

Lemons—Palermo.....10 0 14 0

Messina.....9 0 0 0

Flax—duty free.....£ 0 0 0 0

Archangel.....per ton £2 0 61 10

Riga, P P H D.....0 0 0 0

St. Petersburg, 12-head... 33 0 44 0

9-head.....27 0 29 0

Egyptian, Govmt. dressed... 0 0 0 0

Native ditto.....26 0 4 0

Gutta Percha—per lb s d s d

Genuine.....2 0 3 0

Reballed.....0 5 1 10

Hemp—duty free.....£ 0 0 0 0

St. Petersburg, clean. per ton 30 0 31 0

Outshot.....0 0 0 0

Half-clean.....38 0 37 0

Riga, Rhine.....25 10 30 0

East Indian Spun.....15 0 31 0

Jute.....13 10 30 0

Coir Yarn.....17 0 43 0

Fibre.....18 0 27 0

Hides—Ox & Cow pr lb s d s d

B. A. and M. Vid. dry... 0 7 0 10

Do & R. Grande, salted... 0 8 0 8 4

Brazil, Dry.....0 7 0 8

Drysalted.....0 4 0 7 4

Drysalted Mauritius.....0 4 0 8 4

Rio, dry Rio Grande.....0 7 0 10

West Coast hides.....0 5 0 8

Cape, salted.....0 3 0 0 4

Australian.....0 3 0 8 4

New York.....0 4 0 8 4

East India.....0 2 1 0

S. America Horse, pr hide 4 0 10 0

Indigo—duty free

Bengal good to fine.....5 10 6 10

Do ordinary to middling... 3 4 6 9

Madras.....1 0 6 0

Karrah.....3 6 6 0

Gustemala.....0 10 1 6

India Rubber—per lb 1 4 1 11 4

East India.....0 10 1 6

Para.....1 4 1 11 4

Leather—per lb

Crop hides.....30 to 40 lbs 1 0 1 6

do.....50 65 1 6 1 9

English butts.....16 24 1 2 2 5

do.....38 1 8 2 10

Foreign butts.....16 25 1 1 1 10

do.....28 60 1 3 2 3

Calf Skins.....28 35 1 7 2 6

do.....40 75 1 7 2 6

do.....80 100 1 4 2 2

Dressing Hides.....1 0 1 6

Shaved do.....1 2 1 6

Horse Hides, English.....0 11 1 2

do Spanish.....per hide 7 0 21 0

Kips, English, per lb.....0 11 1 9

do East India.....0 9 2 1

Metals—British Copper

Cake and ingot. per ton 70 0 71 0

Best selected.....72 0 73 0

Sheets.....76 0 77 0

Chili, bars, 2 c. lb.....65 10 65 15

Australian, Wallaroo.....74 0 0 0

do Barra.....74 0 0 0

Yellow Metal.....per lb s d s d

Iron, per ton

Barre, &c., British.....£ 15 6 5

Nail rods.....6 15 7 10

Hoops.....7 10 8 0

Sheets.....9 10 9 10

Bars, Wales.....5 10 5 15

Rails.....6 0 5 10

Swedish.....10 10 11 0

Scotch pig, cash.....61 3 61 3

Lead—English pig. pr ton £18 10 18 15

Spanish pig.....18 10 0 0

Quicksilver.....per bottle 7 2 0 0

Sheet Guttach to Veneer to 12 0 0 0

Plumbago—

Ceylon, lump.....per cwt 12 0 16 6

Provisions—

Butter—Irish.....per cwt 0 0 0 0

Friesland fresh, finest... 149 0 150 0

Jersey.....111 0 152 0

Bacon, singled—Walsford. 70 0 0 0

Limerick.....68 0 70 0

Cork.....68 0 68 0

Hamburg.....59 0 63 0

Hama, York.....100 0 110 0

Irish.....94 0 104 0

Lard—Waterford and

Limerick bladder.....58 0 60 0

Cork and Belfast do... 0 0 0 0

Ferkin and keg, Irish... 50 0 52 0

American & Canadian 0 0 0 0

Pork—Amer. & Can. pr. bl 50 0 85 0

Beef—Amer. & Can. pr. bl 110 0 125 0

Chosse—Edam new.....41 0 63 0

Gouda.....56 0 60 0

Grays.....84 0 90 0

Rice—Soft grain. per cwt 9 10 6

Bengal, table.....11 0 14 0

Do yellow.....9 0 10 6

Madras.....10 6 11 0

Japan.....10 6 11 6

Boslin—American, com... 8 3 6 4 1

Fine.....7 0 10 6

Sago—

Pearl.....per cwt 18 6 20 6

Sago flour.....15 6 15 9

Shellac—per cwt

Orange, good to fine.....68 0 90 0

Livery and native.....65 0 70 0

Garnet A C.....00 0 61 0

Buttons, sorts good to fine... 75 0 95 0

Low to medium.....60 0 70 0

Sticklac, Siam.....48 0 50 0

Silk—

Bengal—Surdah.....per lb 18 0 19 6

Gosimbuzar.....14 0 19 0

Gonatae.....14 0 19 6

Jungypore & Comercolly 14 0 17 6

Hurripal.....9 0 9 0

Radnagore.....12 0 18 0

China—Taslee, No. 1.....0 0 0 0

No. 2.....19 0 20 6

No. 3.....16 0 18 6

No. 4 and 5, &c.....11 0 20 0

Taysnam.....9 0 13 6

Long-reeled.....9 0 13 6

Canton.....12 0 17 0

Re-reeled.....17 0 19 6

Japan—Low to fine.....12 0 21 0

Patent Brutia.....37 0 33 0

Persian.....9 0 11 0

Italian—Raw, white Novl... 0 0 0 0

Fossombrens.....0 0 0 0

Other kinds.....0 0 0 0

Organsines—Piedmont.....30 0 35 0

Milan.....28 0 30 0

Trams do.....26 0 37 0

Spices—Pepper—

Black, Eastern.....per lb 0 3 0 3 4

Alleppey and Malabar... 0 3 0 6 4

White.....0 5 0 6 4

Pimento—Mid. and good... 0 4 0 4 4

Cinnamon, 1st Ceylon.....2 2 5 6

Do 2nd do.....2 0 2 9

Do 3rd and 4th.....1 6 2 3

Cassia Ligna.....43 0 43 6

Cloves—Zanzibar.....1 2 1 8

Pennang.....1 8 2 0

Ginger—per cwt.

Cochin, scraped.....70 0 115 0

Do rough.....48 0 65 0

Bengal.....21 6 22 0

African.....24 0 25 0

Jamaica, low and ord... 63 0 63 0

Do mid to fine.....65 0 200 0

Mace.....per lb 1 2 3 0

Nutmeg, brown.....2 0 4 0

Spirits—Rum, duty 10s 2d per gal.

Jamaica, per g. l. bond,

50 to 35 O. F.....2 10 3 2

Fine marks.....4 8 5 0

Demerara, g. l. bond, proof 1 6 1 10

T. and W. Island.....1 6 1 10

Sugar (continued)

Refined—For consumption

Titlers.....

Plecco.....

Bastard.....

Trepas.....

For export, free o. h.

Turkey leaves, 6 to 1

Crushed.....

Plecco.....

Dutch, refined, f. o. b. in

20 lb leaves superfine

2) lb do No. 1

Crushed, superfine, in

— No. 1

— No. 2

Belgian refined, f. o. b. a

4 a d 3 Kilo leaves

Crushed, No. 1 in bar

Fr. nch leaves, f. o. b.

# GDP and Price level data

Real GDP from Barro and Ursua (2010)

Price levels computed based on inflation rates data from Reinhart and Rogoff (2011)

Additional sources: Maddison (2013) and Pisha et al. (2015)

Summary Statistics	Observations	Mean	Std. Dev.	Min	Max
Real GDP per capita (percentage change)	1,513	1.44	5.86	-29.1	20.5
Unemployment rate (percentage change)	1,376	1.23	8.71	-51.1	12.5
Oil- Export price (percentage change)	1,425	0.62	15.2	-32	25.5
Real Effective Interest rate (basis points)	1,148	520	3.42	106	1,000

# Outline

1. *Introduction*

2. *Data*

3. **Empirical Framework**

4. Results

5. Conclusion

# Empirical Framework:

## identify 2 types of exogenous shocks

### **I. External demand shocks**

- Our measure: Annual percentage change in real principal-export price
  - Most economies pre-1913 subjected to the “commodity lottery”
    - Production “pre-determined” in the sense that they specialized in producing goods subject to factor endowments
      - Blattman et. al.2007; Findlay 2003; O’Rourke and Williamson 1994
  - Economies as price takers
    - Consider exceptions in robustness checks
- Not perfectly correlated across countries



# The Commodity Lottery

Economy	Principal Export	Economy	Principal Export	Economy	Principal Export
Argentina	Wool	Finland	Timber	Norway	Timber
Australia	Wool	France	Wool mf.	Peru	Sugar
Austria-Hungary	Timber	Germany	Cotton mf.	Portugal	Wine
Belgium	Cotton mf.	Greece	Nuts	Romania	Wheat
Brazil	Coffee	Iceland	Fish	Russia	Wheat
Bulgaria	Wheat	India	Cotton	Spain	Iron
Canada	Timber	Italy	Silk	Sweden	Timber
Chile	Nitrate	Japan	Silk	Switzerland	Silk mf.
Denmark	Butter	Mexico	Silver	Turkey	Silk
Egypt	Cotton	Netherlands	Iron prod.	USA	Cotton

Empirical Framework: identify 2 types of exogenous shock

## “Gold Standard Instrument”

In the presence of no capital controls and fixed exchange rates, the IPT implies that when a base country's interest rate changes, to maintain their pegs, other countries must respond by changing their interest rates

where the policy rate is controlled by a central bank (in countries where they existed), or in the absence, through a no-arbitrage condition in financial markets

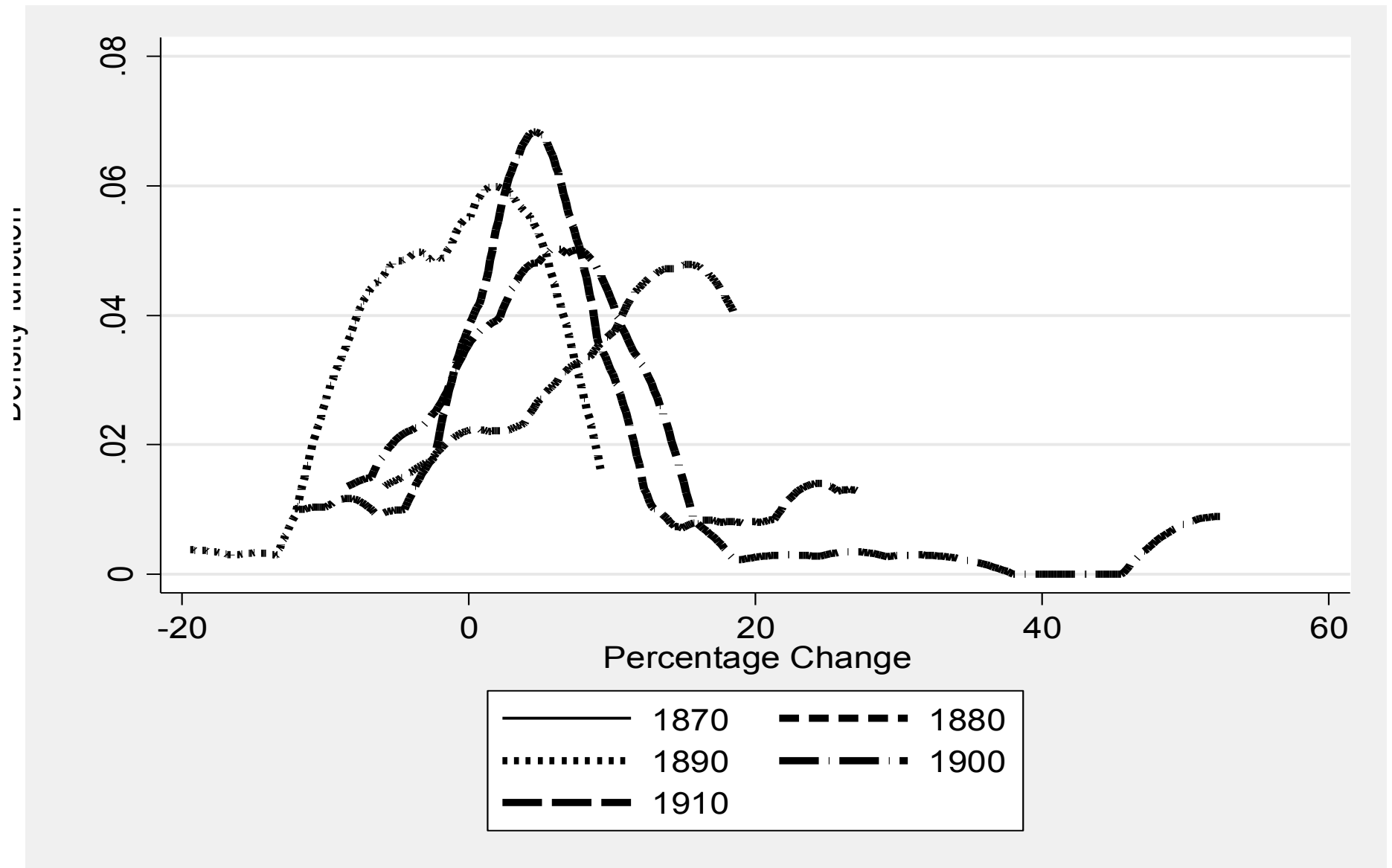
$$\Delta i_{i,t} = (\Delta i_{UK,t} - \Delta i^*_{UK,t}) \times Peg_{i,t-1} \times Peg_{i,t}, \quad (1)$$

$\Delta i_{UK,t}$  change in the interest rate in the UK

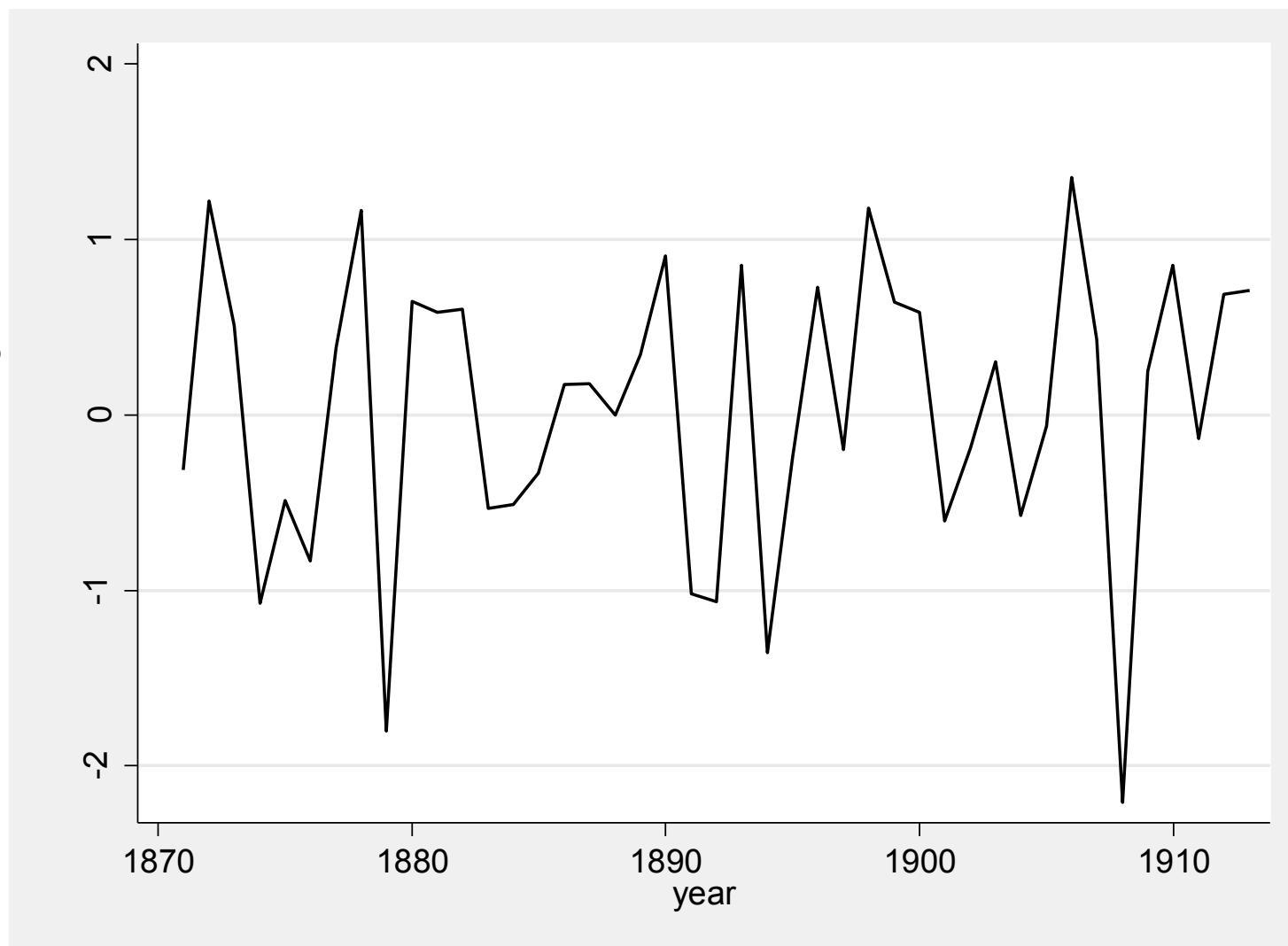
$\Delta i^*_{UK,t}$  change in the interest rate in the UK predicted by observable domestic variables

$Peg$  equal to 1 if country formally adheres to the gold standard, 0 otherwise. Intuitively, captures changes in the interest rate of the base country, UK, not explained by observable domestic UK Variables.

# Kernel Density Plot of Export Price Shocks (defined as percentage change in real export price)



# UK interest rate changes



# Examining the trilemma instrument

	No controls	Country Fixed Effects	Country Fixed Effect controls
Constant	-0.009	-0.009***	1.436***
	(0.011)	(0.000)	(0.173)
Trilemma Instrument	0.315***	0.318***	0.228***
	(0.089)	(0.089)	(0.067)
Observations	1,055	1,055	1,019
Adjusted R-squared	0.006	0.006	0.220
Number of countries	30	30	30

Controls are country specific time-trends and two lags for international financial crisis dummy, domestic financial crisis dummy, international war, intra-national war, central bank dummy, stock market dummy. Robust SEs (country cluster)

We explore different combinations of shocks

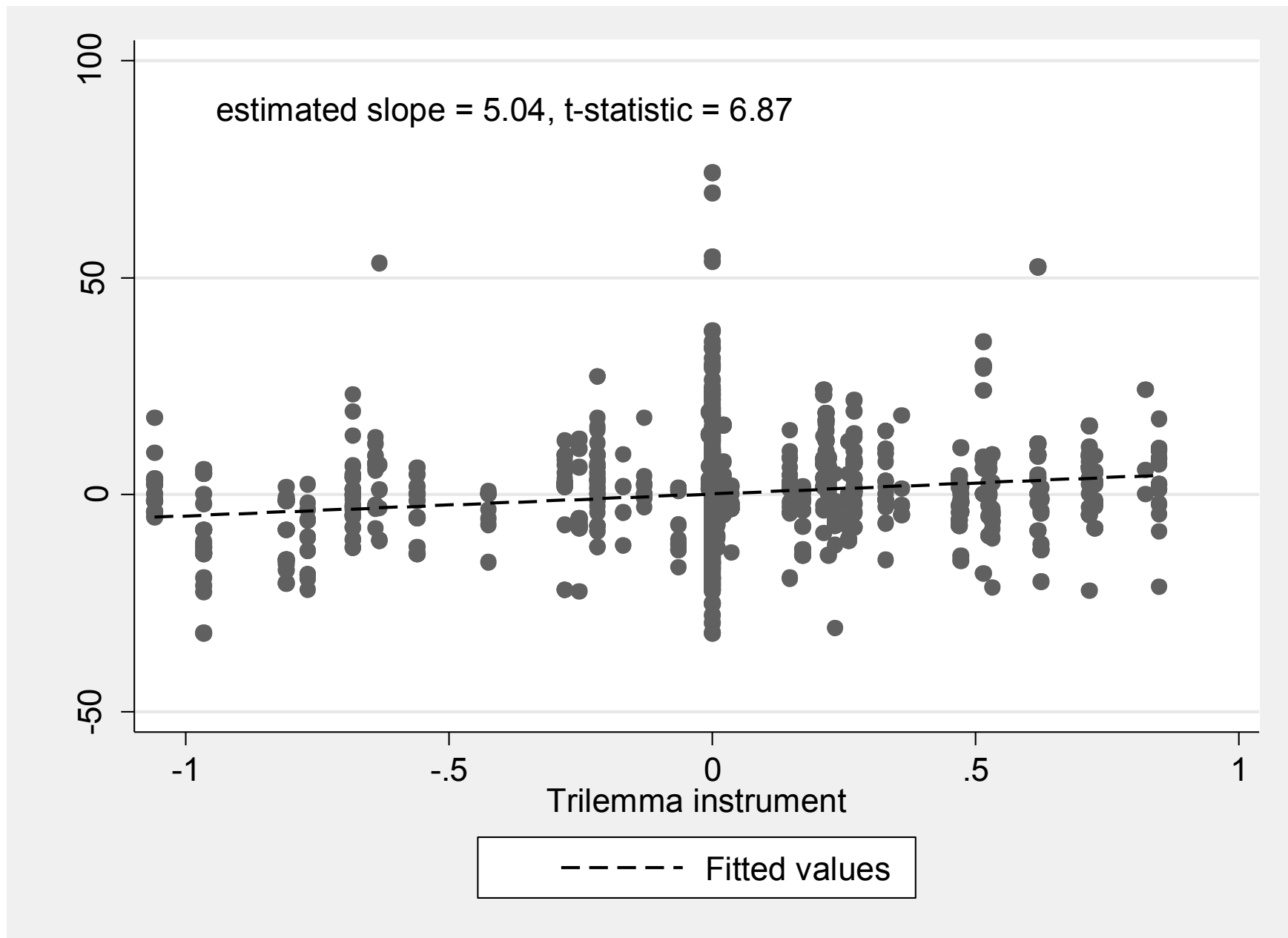
	External Demand	Shock
Monetary Policy Shock	$+, +$	$-, +$
	$+, -$	$-, -$

These combinations allow causal estimates of countercyclical monetary

Because we are interested in identifying the independent influence of interest-rate and external demand shocks, for a given country, the two types of shocks should not be highly correlated.

The unconditional correlation coefficient between the trilemma instrument  $Z_{i,t}$  and the percentage change in the real-export price is 0

partial exogenous variation in the joint distribution of real and interest rate shocks  
identify their independent effects



estimate effects of real export price and policy shocks on real GDP growth and inflation using Local Projections Methods (Jorda 2005)

We estimate 
$$\delta_{i,t} = \alpha_i + x_{i,t}g_h + \mu_{i,t}b + \varepsilon_{i,t}, \quad (2)$$

- $\delta_{i,t}$  is the domestic change in the interest rate in country  $i$  at time  $t$ ,
- $\alpha_i$  is the country- fixed effect,
- $x_{i,t}$  captures country controls, including the real shock
- $\mu_{i,t}$  is the trilemma instrument

From this equation we obtain  $\delta^*$ , the predicted value of the domestic change in the interest rate, our policy shock, that we then use to estimate the causal impact of real and policy shocks on real GDP growth or CPI inflation at different horizons ( $y_{i,t+h}$ ):

$$y_{i,t+h} = \alpha_{i,h} + x_{i,t}\gamma_h + \delta_{i,t}^* \beta_h + y_{UK,t}\omega + \vartheta_{i,t+h}. \quad (3)$$

- $y_{UK,t}$  represents either real GDP growth or CPI inflation for the UK



# Measurement

Responses measured as 100 times the log difference

Effects in percent of year 0

# Outline

1. *Introduction*

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3. *Empirical Framework*

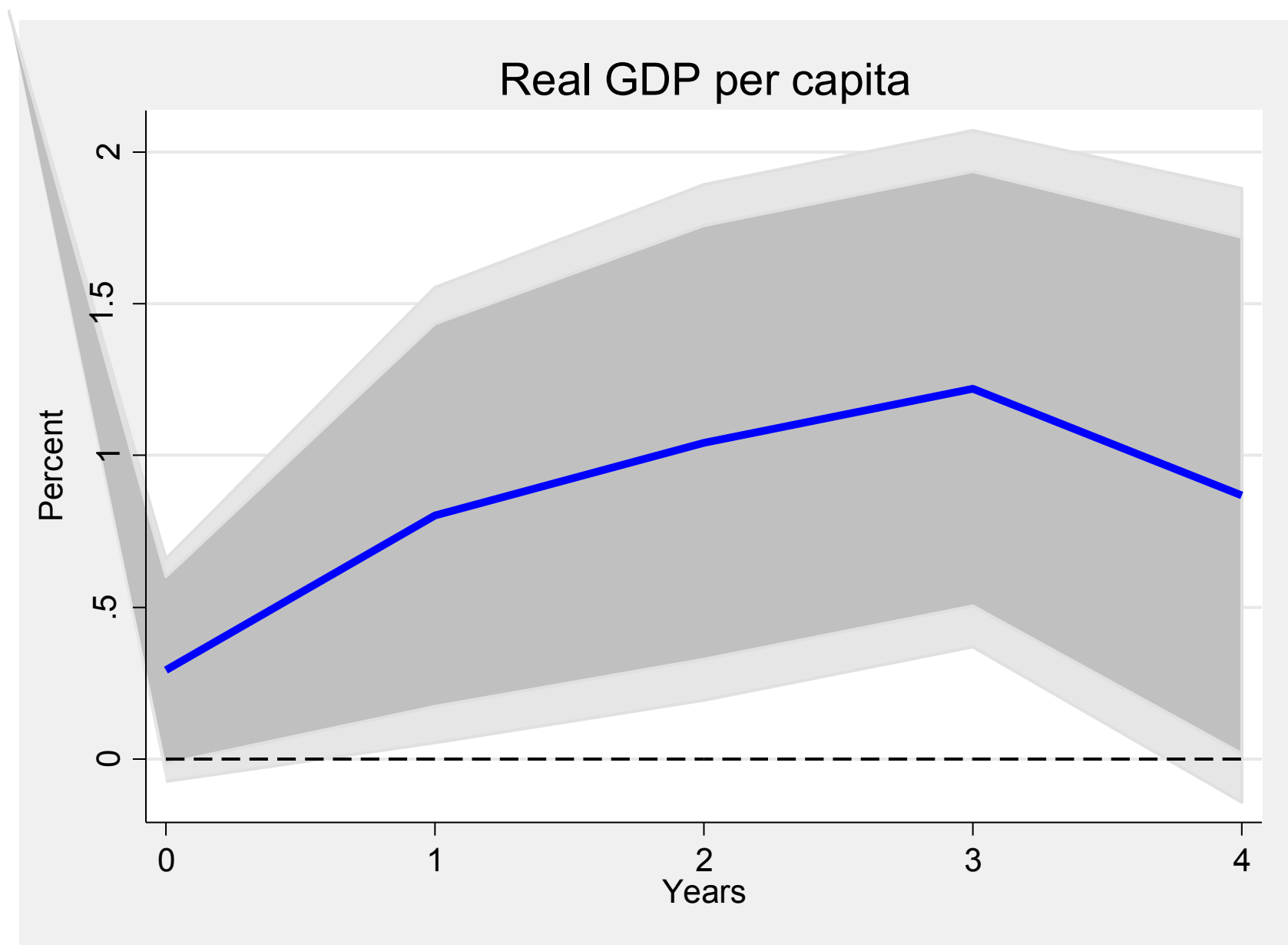
4. **Results**

5. *Conclusion*

# LP-IV estimates for real GDP per capita and Price level responses to changes in real principal-export prices and interest rates

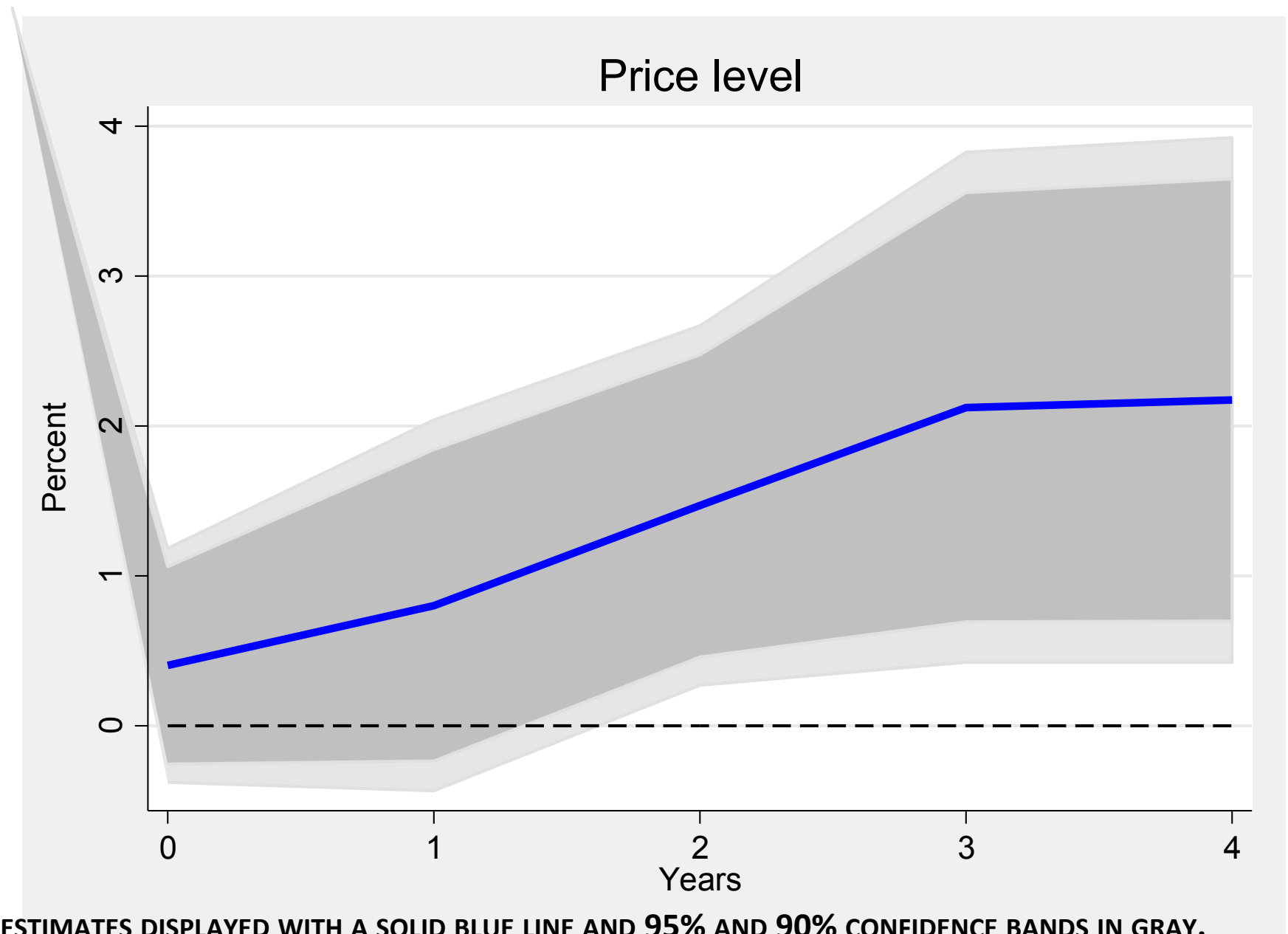
Responses at years 0 to 4 (100 x log change from year 0 baseline)				
	Export-price shock		Interest-rate shock	
	Real GDP	Price Level	Real GDP	Price Level
	0.034**	0.033	-0.270	-0.270
	(0.017)	(0.036)	(1.105)	(1.642)
	0.081**	0.071	-3.420**	-0.001
	(0.035)	(0.056)	(1.642)	(1.550)
	0.099**	0.124**	-4.799**	0.200
	(0.042)	(.0540)	(2.145)	(1.900)
	0.109**	0.192**	-3.333	-4.430
	(0.041)	(0.078)	(2.190)	(2.000)
	0.072	0.198**	-4.798**	-5.410
	(0.046)	0.079	(2.157)	(2.300)
Large F, h=0			9.07	7.50
Estimations, h=0	678	650	678	650

# One SD increase in real principal-export price

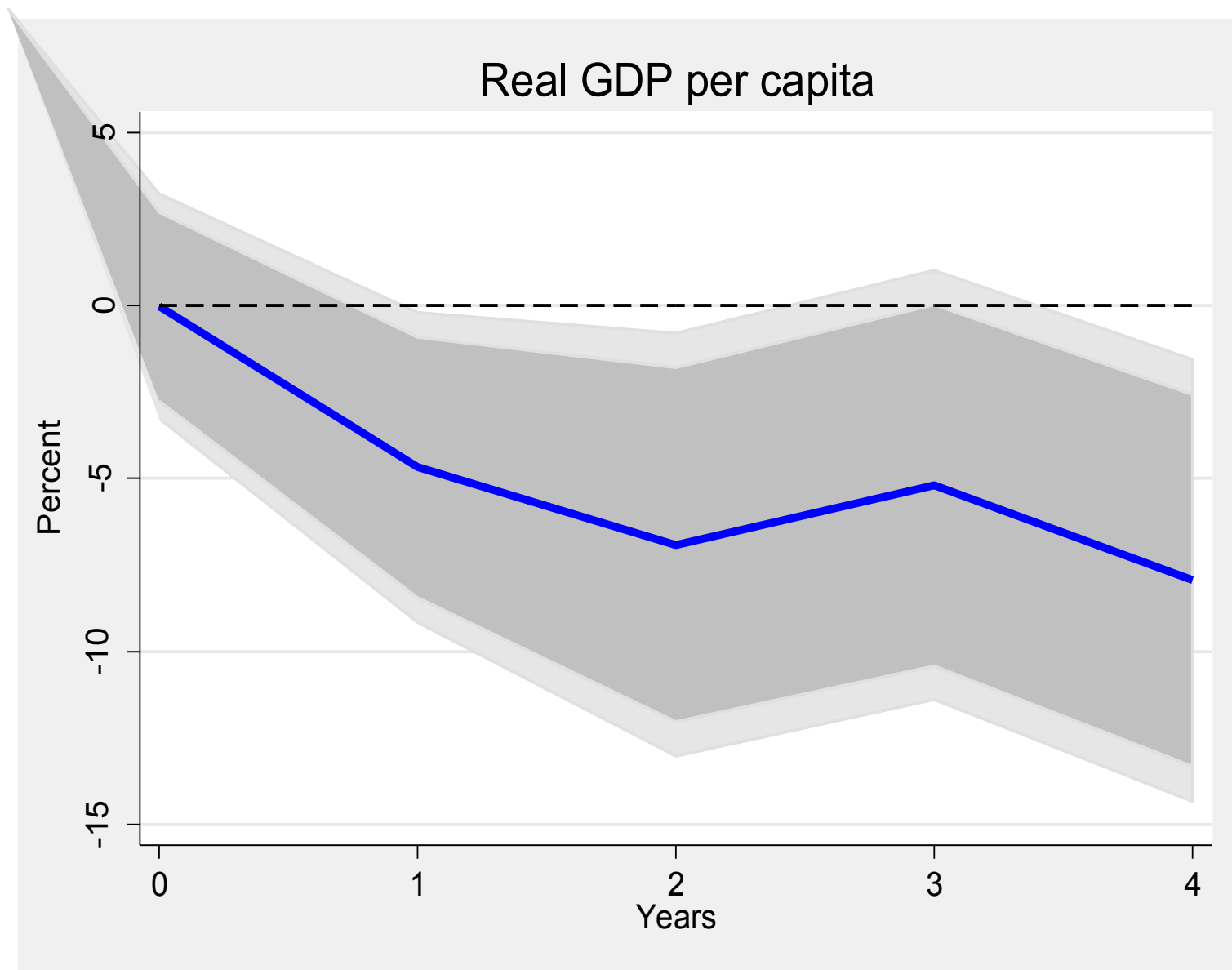


NOTES: LP-IV ESTIMATES DISPLAYED WITH A SOLID BLUE LINE AND 95% AND 90% CONFIDENCE BANDS IN GRAY.

# One SD increase in real principal-export price

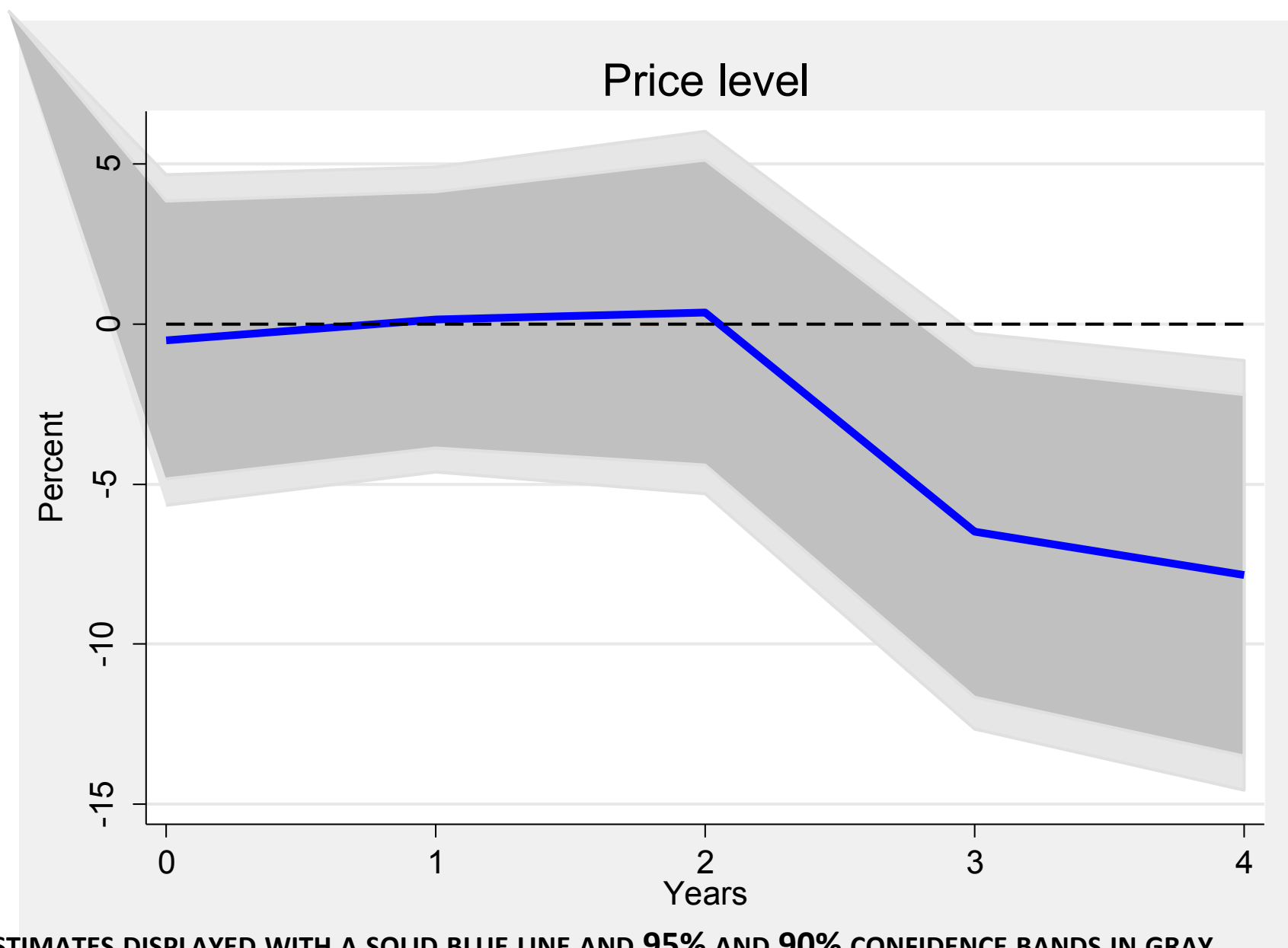


# One SD increase in domestic short-term interest rate



NOTES: LP-IV ESTIMATES DISPLAYED WITH A SOLID BLUE LINE AND 95% AND 90% CONFIDENCE BANDS IN GRAY.

# One SD increase in domestic short-term interest rate



# Estimating Countercyclical Monetary Policy

$$y_{i,t+h} = \alpha_{i,h} + I(\text{Countercyc}_{i,t})x_{i,t}\gamma_h^c + (1 - I(\text{Countercyc}_{i,t}))x_{i,t}\gamma_h^p + y_{i,t}\delta_{i,t}^*\beta_h + \vartheta_{i,t+h},$$

*Countercyclical*) takes on the value of 1 when the percentage change in the real exchange rate is positive (negative), and the trilemma instrument takes on a positive value (negative).

*Procyclical*) takes on the value of 1 when the percentage change in the real exchange rate is positive or zero (negative or zero), and the trilemma instrument takes on a negative value (positive or zero).

In this specification we do not allow other coefficients to be different.

Note: only relatively “large” changes take on value of 1

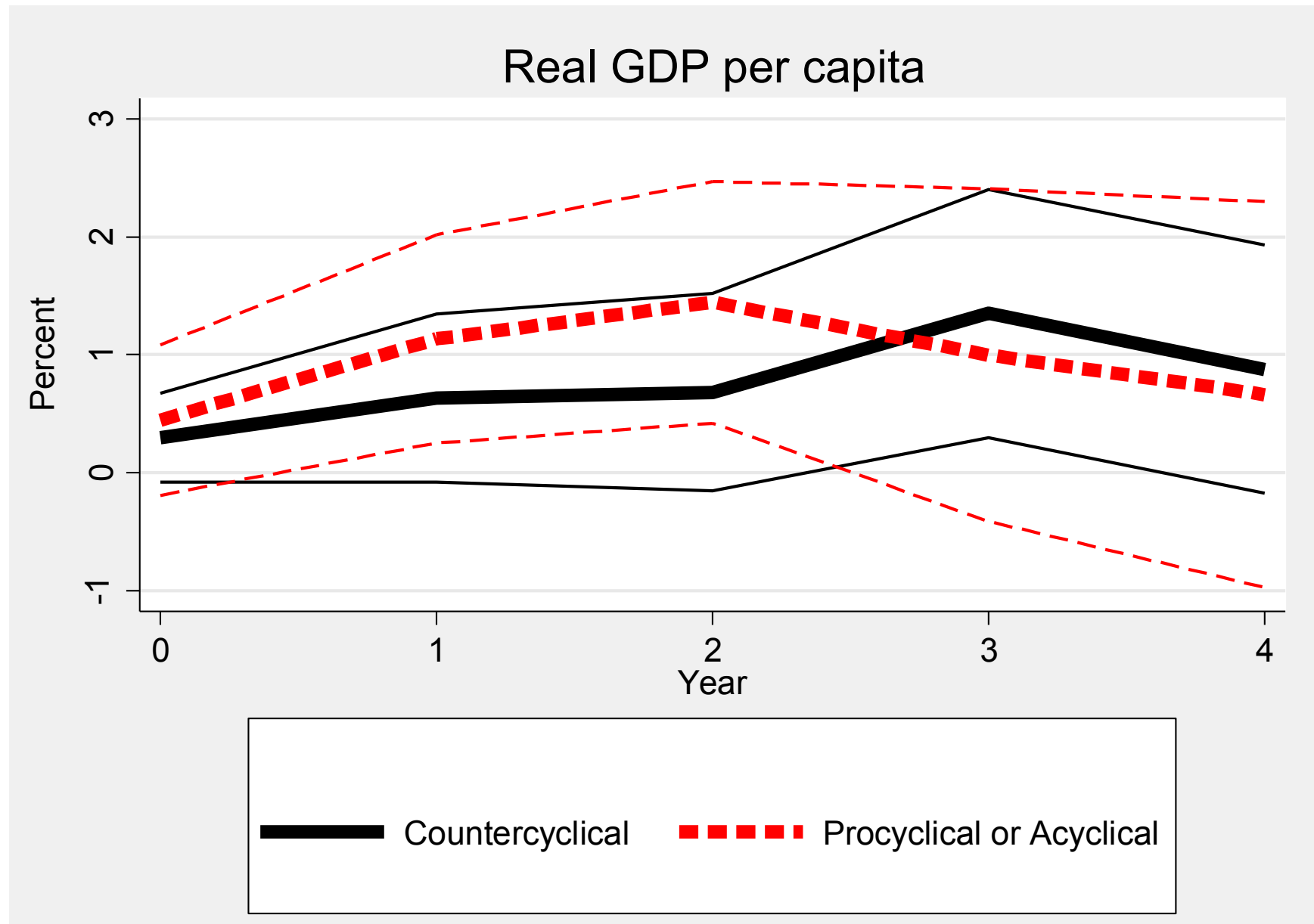


# Micro Responses to Countercyclical & Procyclical/Acyclical interest-rate shocks

Impulse responses at years 0 to 4 (100 x log change from year 0 baseline)

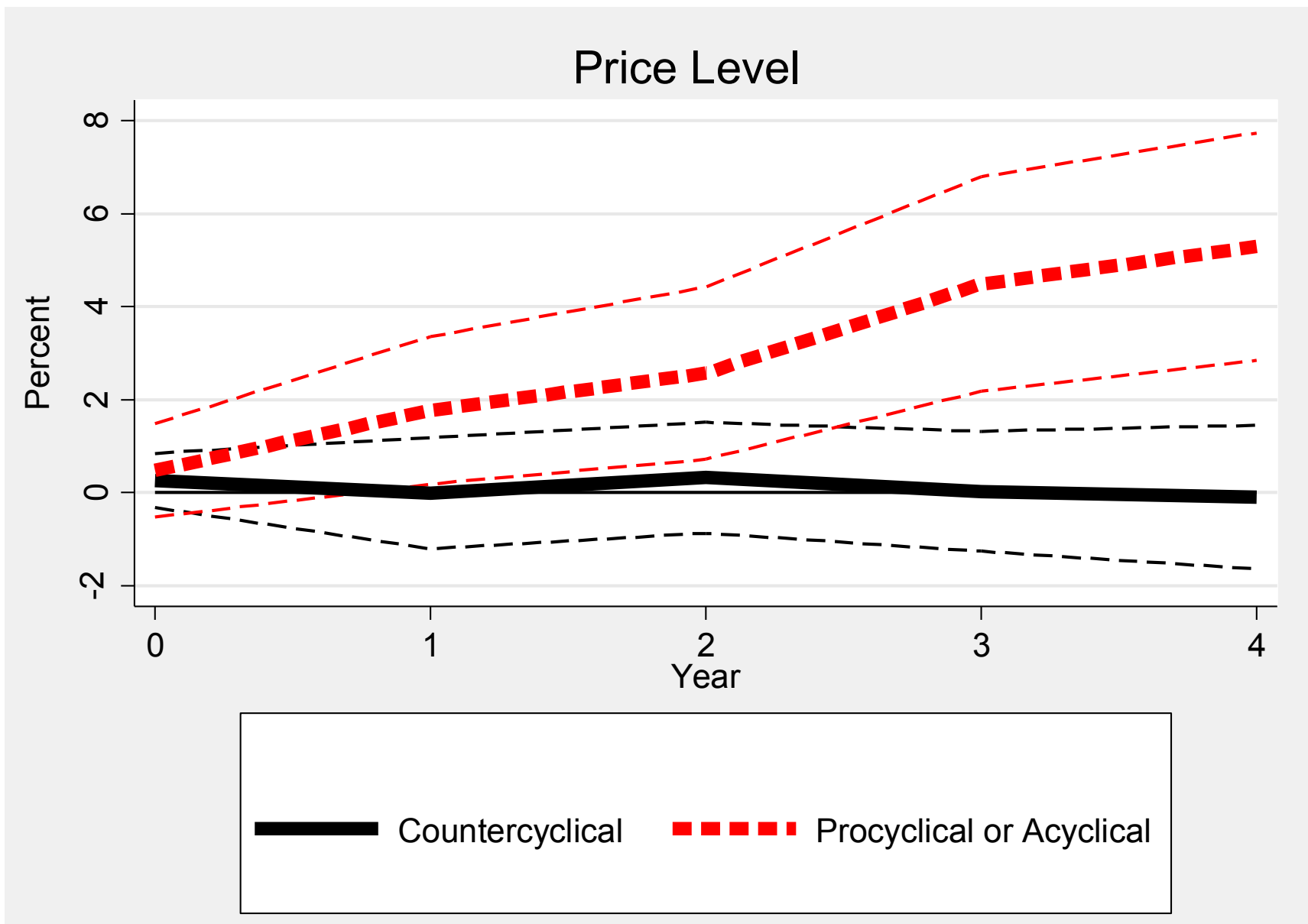
	Export-price shock			
	Countercyclical		Procyclical/Acyclical	
Year	Real GDP	Price Level	Real GDP	Price Level
h=0	0.027	0.024	0.041	0.044
	(0.021)	(0.033)	(0.036)	(0.057)
h=1	0.059	-0.001	0.105**	0.164*
	(0.040)	(0.067)	(0.050)	(0.090)
h=2	0.063	0.029	0.134**	0.238**
	(0.048)	(0.067)	(0.058)	(0.104)
h=3	0.125**	0.002	0.092	0.415***
	(0.059)	(0.073)	(0.080)	(0.130)
h=4	0.081	-0.009	0.061	0.490***
	(0.059)	(0.087)	(0.092)	(0.138)
First-stage F, h=0	34.9	36.9	34.9	36.9
Observations h=0	678	650	678	650

# Effects of countercyclical policy on GDP



LP-IV ESTIMATES DISPLAYED WITH A THICK LINE AND 95% AND 90% CONFIDENCE BANDS IN LIGHTER-TONED LINES OF SAME-COLOR

# Effects of countercyclical policy on Price Level



LP-IV ESTIMATES DISPLAYED WITH A THICK LINE AND 95% AND 90% CONFIDENCE BANDS IN LIGHTER-TONED LINES OF SAME-CO

# Redefining Countercyclical cases

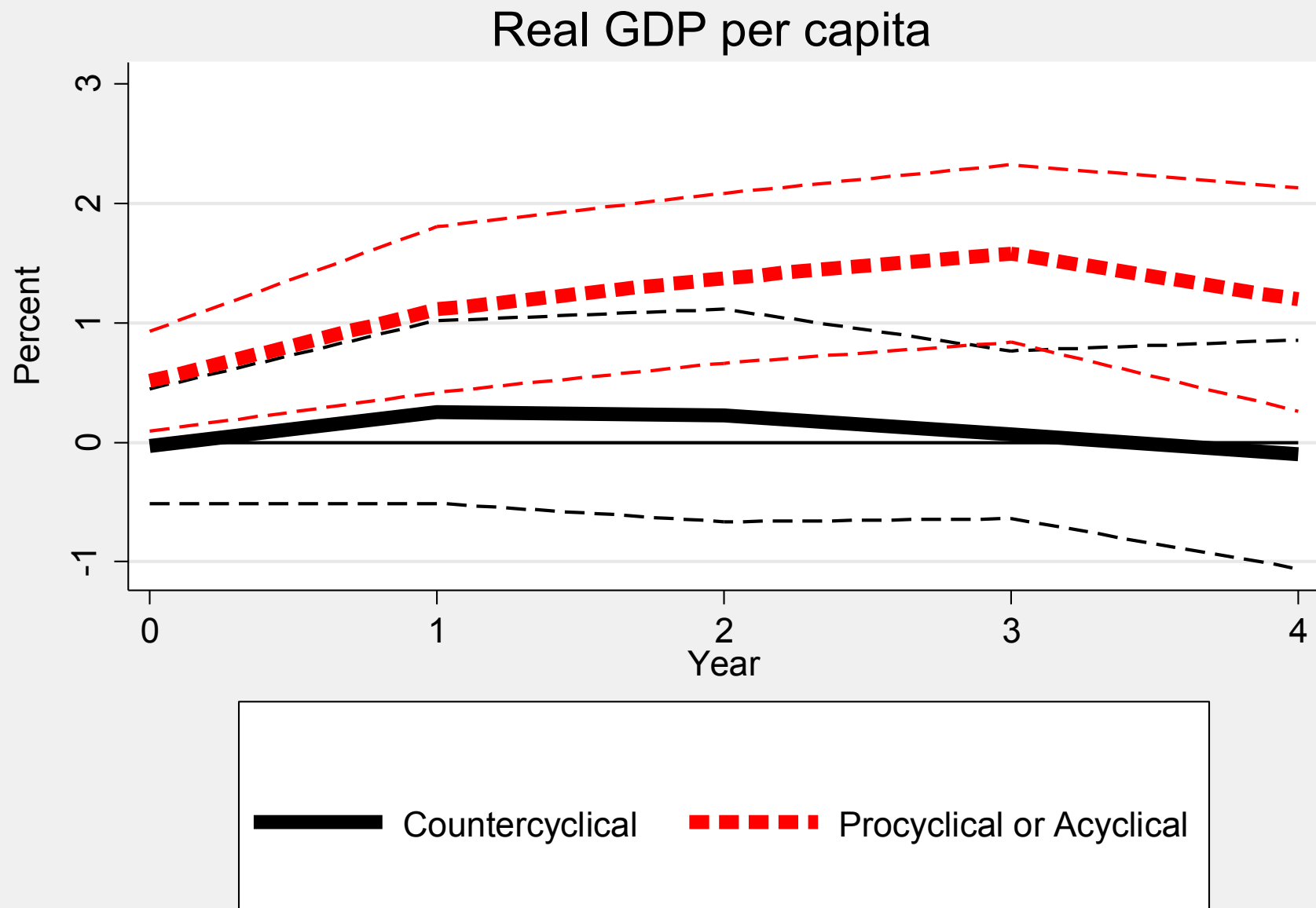
Confine it to “stronger” interest-rate movements

Trilemma instrument is equal or above a one standard deviation, either positive or negative, are now “countercyclical” events

- Trilemma instrument that are larger than one standard deviation, 0.4, (or less than -0.4 for the negative case).
- We classify all other cases, including changes in the value of the instrument within the -0.4 and 0.4 ranges, as procyclical/acyclical.

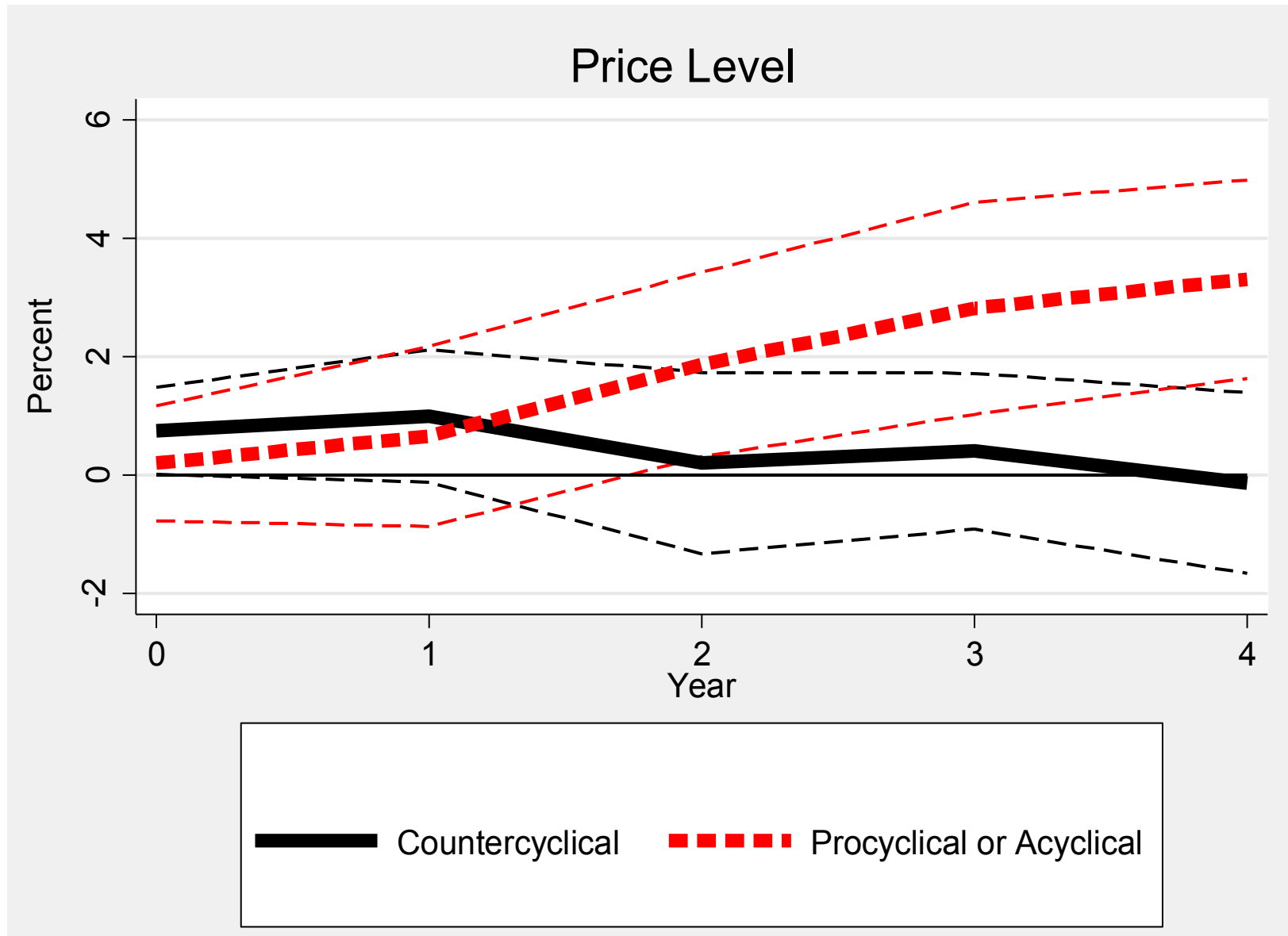
Note that the contemporaneous pass-through to domestic rates shown earlier is about 0.3 → imposing a band of 0.12 around zero for a domestic interest-rate shock to be potentially classified as countercyclical.

# Effects of (stronger) countercyclical policy on GDP



LP-IV ESTIMATES DISPLAYED WITH A THICK LINE AND 95% AND 90% CONFIDENCE BANDS IN LIGHTER-TONED LINES OF SAME-COLOR

# Effects of (stronger) countercyclical policy on Price level



LP-IV ESTIMATES DISPLAYED WITH A THICK LINE AND 95% AND 90% CONFIDENCE BANDS IN LIGHTER-TONED LINES OF SAME-CO

# Asymmetric Effects?

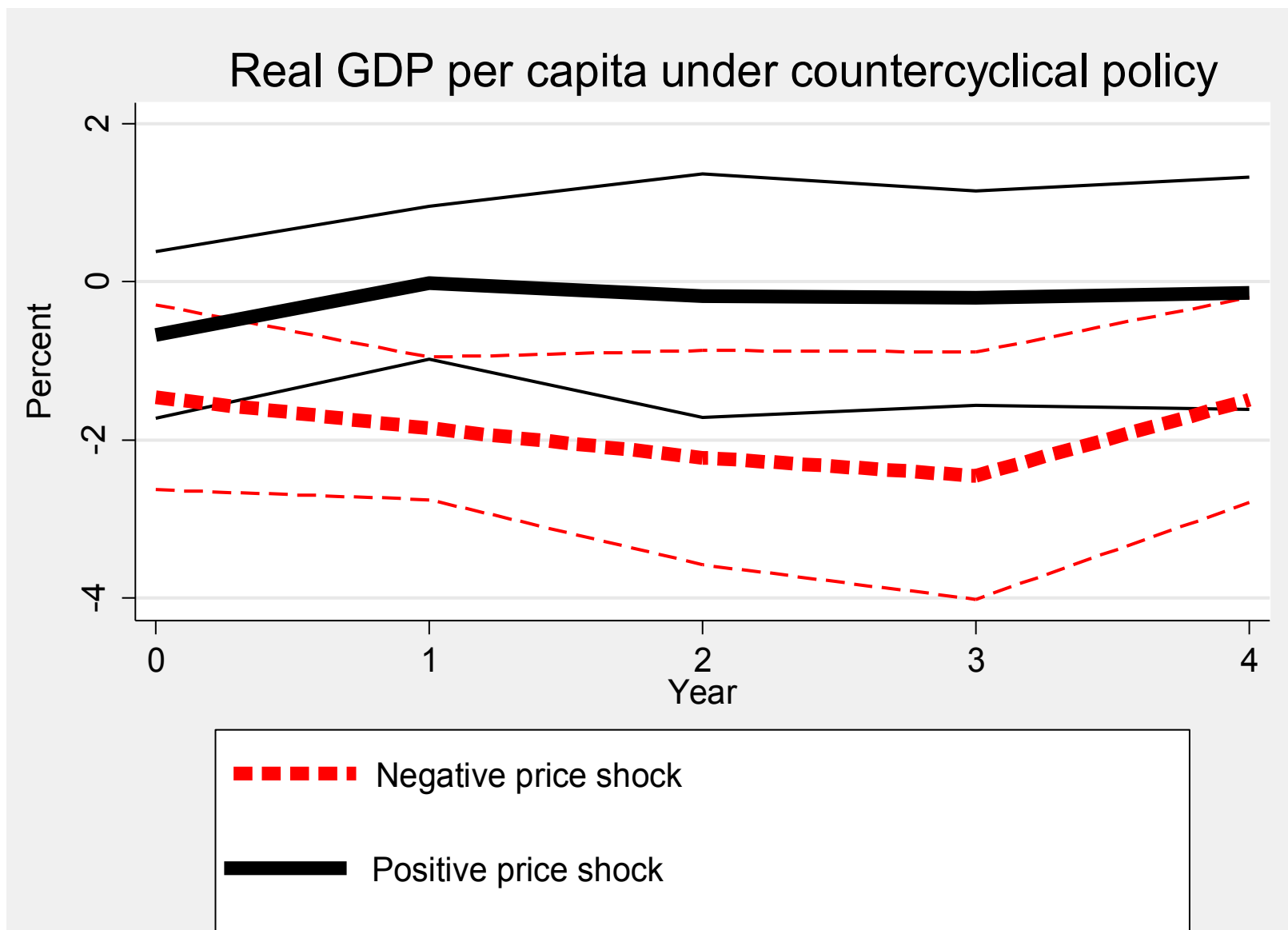
Examine whether countercyclical policy has the same effect under positive or negative demand shocks.

Construct two new dummy variables.

- . “Positive,” takes on the value of 1 if real export-prices increase and the trilemma instrument is positive at time  $t$  and zero otherwise.
- . “Negative,” takes on the value of 1 if real export-prices decrease and the trilemma instrument is negative at time  $t$  and zero otherwise.

We employ the bands around zero given by the standard deviation of the trilemma instrument to avoid considering very small interest rate changes as part of the countercyclical experiments.

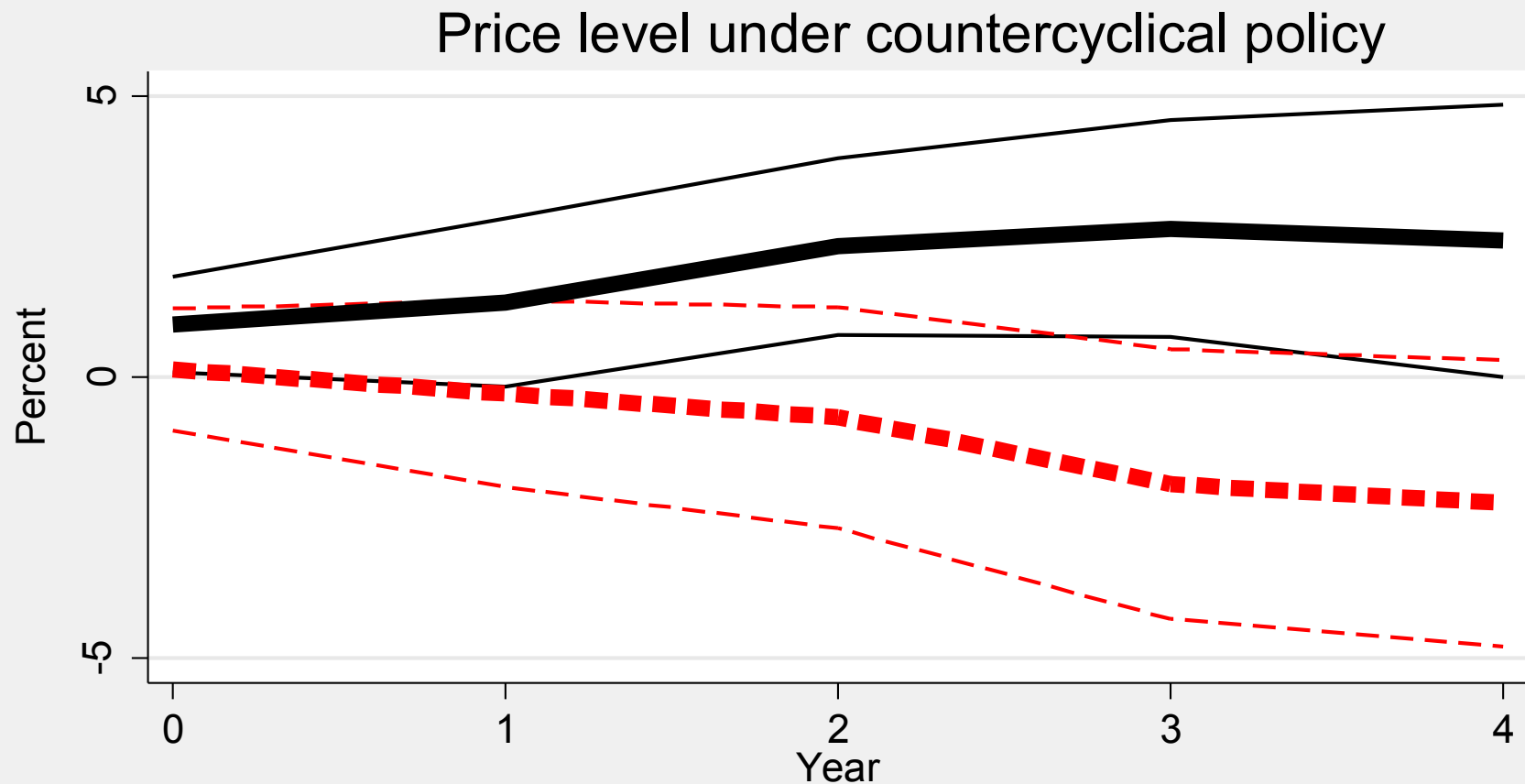
# Asymmetric Effects (GDP)



LP-IV ESTIMATES DISPLAYED WITH A THICK LINE AND 95% AND 90% CONFIDENCE BANDS IN LIGHTER-TONED LINES OF SAME-COLOR



# Asymmetric Effects (Price level)



■ ■ ■ ■ Negative price shock

■ ■ ■ ■ Positive price shock

LP-IV ESTIMATES DISPLAYED WITH A THICK LINE AND 95% AND 90% CONFIDENCE BANDS IN LIGHTER-TONED LINES OF SAME-CO

# Other Robustness Checks

Dropped France (an alternative base country)

Dropped “monopoly” producers of commodities: Chile, Mexico, Peru

# Conclusion

Economies of the late 19<sup>th</sup> and early 20<sup>th</sup> centuries were subjected to large and variable external demand shocks operating through changes in commodity prices

- These generated fluctuations in both output and prices

Coping with these in a world where core-country policy makers were committed to maintaining the gold standard might have meant using fiscal policy

- However, the era pre-dates Keynes and such expenditure was really not widely employed

Exploring the causal impact of countercyclical MP, we find that has the potential to moderate business cycle fluctuations (reducing them by about half), but largely when external demand shocks are positive

The asymmetric responsiveness of countercyclical MP is an area for future research.

# Data Sources & Robustness

## Robustness

- Dropped Chile, Mexico and France - > similar results
- Additional controls including domestic and international financial crises, wars, debt default, establishment of central bank, establishment of stock market.
- Future work
  - Change base rate to Germany, France
  - Portfolio of exports and initial principal export
  - Falsification tests with interest rates from China, Spain

imates for real GDP per capita and CPI price responses to real principal-e  
 es for countercyclical interest rates or for procyclica/acyclical interest ra

Responses at years 0 to 4 (100 x log change from year 0 baseline)

Year	Export-price shock			
	Countercyclical		Procyclical/Acyclical	
	Real GDP	Price Level	Real GDP	Price Level
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h=1	0.059 (0.040)	-0.001 (0.067)	0.105** (0.050)	0.164* (0.090)
h=2	0.063 (0.048)	0.029 (0.067)	0.134** (0.058)	0.238** (0.104)
h=3	0.125** (0.059)	0.002 (0.073)	0.092 (0.080)	0.415*** (0.130)
h=4	0.081 (0.059)	-0.009 (0.087)	0.061 (0.092)	0.490*** (0.138)
Observations h=0	678	650	678	650

	Real GDP	Data Source and Notes for Real GDP	Inflation	Data Source and Notes for Inflation
	1875-1913	Ferreres, Orlando J. (director), Dos siglos de economía argentina (1810-2004): Historia argentina en cifras, Fundación Norte y Sur, Buenos Aires, 2005.	1870-1913	CPI, Williamson, Jeffrey, (1999), "Real Wages, Factor Price Equalization and Globalization in Latin America before 1940," Revista de Economía 17, 101-142.
	1870-1913	Maddison	1870-1913	CPI, Mitchell, Brian R. (2003). International Historical Statistics for Latin America, Asia, and Oceania, 1750–2000.London: Palgrave Macmillan
	1870-1913	Butschek, Felix, “The Austrian Economy in World War II”, in: Mills, Geoffrey T. and Hugh Rockoff (eds.), The Sinews of War: Essays on the Economic History of World War II, Iowa State University Press, Ames, U.S.A., 1993.	1870-1913	CPI, Flandreau, Marc and Frederic Zumer (2004), The Money Market in Europe and Finance: 1880-1913, (Paris:OECD).
	1870-1913	Maddison	1870-1913	CPI, Allen, Robert,n.d., Consumer Price Indices, Nominal and Real, Building Craftsmen and Laborers, 1260-1913, Oxford: Clarendon Press. At <a href="http://www.iisg.nl/hpw/data.php#netherlands">http://www.iisg.nl/hpw/data.php#netherlands</a> .
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	1870-1913	Maddison	1870-1913	CPI, Diaz, Jose B., Rolf Luders, and Gert Wagner (2005), "Real Wages, 1810-2000, La Republica en Cifras," Instituto de Economía y Estadística, Universidad Catolica de Chile, May.
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1870-1913	Fenoaltea, Stefano, "The growth of the Italian economy, 1861-1913: Preliminary second-generation estimates", <i>European Review of Economic History</i> , 9, pp. 273-312.	1870-1913	CPI, Mitchell, Brian R. (2003). <i>International Historical Statistics 1750–1988</i> . London: Palgrave Macmillan.
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1896-1913	Seminario, Bruno and Arlette Beltrán, Crecimiento Económico en el Perú: 1896-1995; Nuevas Evidencias Estadísticas, Universidad del Pacífico, CIUP, Perú, 1998.	1870-73 & 1901-13	CPI, Diaz, Jose B., Rolf Luders, and Gert Wagner (2005), 1810-2000, La Republica en Cifras," Instituto de Economía y Estadística, Universidad Catolica de Chile, May.
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1870-1913	Maddison	1870-1913	CPI, Bastien, Carlos (2001), Precos e Salarios, in Estadísticas Económicas de Portugal, 1250-2000, (Portugal: Instituto Nacional de Estatística)
1880-1913	Pisha, Arta, Besa Vorpsi, Neraida Hoxhaj, Clemens Jobst, Thomas Scheiber, Kalina Dimitrova, Martin Ivanov, Sophia Lazaretou, George Virgil Stoenescu et al., "South-Eastern European Monetary and Economic Statistics from the Nineteenth Century to World War II," Publications, 2015.	-	
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1870-1913	Maddison	-	
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1883-1913	Baptista, Asdrúbal, Bases Cuantitativas de la Economía Venezolana: 1830-1995, Fundación Polar, Caracas, Venezuela, 1997.	1870-1913	CPI, Baptista, Asdrubal (2006). Bases Cuantitativas de la Economía Venezolana, 1830–2005. Caracas: Ediciones Fundación

# Regression observations by country

Argentina	13	Iceland	11
Australia	42	India	15
Austria-Hungary	21	Italy	11
Belgium	35	Japan	15
Brazil	6	Mexico	8
Bulgaria	10	Netherlands	38
Canada	38	Norway	40
Chile	3	Peru	11
Denmark	40	Portugal	11
Egypt	19	Romania	23
Finland	35	Russia	16
France	35	Sweden	40
Germany	41	Switzerland	34
Greece	2	Turkey	33
		USA	35